

Application No. 09/815,816
Amendment Date April 13, 2004
Reply to Office action of March 16, 2004

Remarks/Arguments

In the specification, the paragraphs [0058], [0060], [0073], [0087], [0092], and [0094] have been amended to correct minor editorial problems. The new paragraphs now mention all reference signs in the Figures.

In the drawings, Figure 3, Figure 5, Figure 10, and Figure 11 have been amended to add omitted elements and pointer and remove extra elements. In addition, some element labels are corrected.

Applicant submits that this application is now in full compliance with 37 CFR 1.84(p)(5).

Claims 1-2, 4, 6-8, 11-13, 19, and 21 remain in this application. Claims 3, 5, 9-10, 14-18, and 20 have been canceled.

The remarks for the remaining claims are discussed as follows:

Claim 1:

Claim 1 is changed to correct the informalities that were objected to by Examiner Patel. Examiner Patel further rejected claims 1 under 35 U.S.C. § 103(a) as being unpatentable over Muraoka (US 58,446,542). Applicant respectfully traverses Examiner Patel's rejections based on the arguments stated below. Examiner Patel rejected claim 1 on the basis that the spatial filter 8 discloses in Maraoka (col. 3 lines 30-33 and col. 4 lines 14-19) would perform equally well as directional elongated filter. Although the spatial filter and the directional elongated filter are both a kind of "filter", upon a closer reading it becomes clear that the spatial filter of Maraoka is an optical element of a mark position determining apparatus (Maraoka figures 1A, 1B and 1C). Maraoka spatial filtering teaches away from filtering at image domain. The Maraoka spatial filter interacts with lights rather than digital images. Its purpose is to shield reflected light and allow passage of scattered lights (Maraoka col. 2 lines 24-32). The Maraoka spatial filter does not

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process the mark image. The directional elongated filter of the present invention uses feature direction for effective processing to reduce noise and enhance signal. It can be applied to any orientation and works even if the input edge is slightly rotated (pages 16-17 of the specification). The directional elongated filter of the present invention that operates on digital images is patentably distinct from the Maraoka spatial filter.

Claim 2:

Examiner Patel rejected claims 2 under 35 U.S.C. § 103(a) as being unpatentable over Muraoka (US 58,446,542) in view of Ina (US 4,886,974). Specifically, on the basis that Ina disclosed classifying mark type as a prior art. Ina disclosed commonly known manual pre-categorization of alignment mark types (Ina col. 1 lines 33-45). The present invention discloses a method to automatically classify mark type with specific steps to accomplish the automation. This is patentably distinctive from Ina's disclosure of manual mark type classification. We added the two mark type classification steps to claim 2 to underscore the automation of the mark classification in the present invention that is patentably distinct from the prior art.

Claim 4:

Examiner Patel rejected claims 4 on the basis that Muraoka disclosed obtaining the size and the shape of the alignment mark (Muraoka col. 4 lines 12-19 and col. 6 lines 27-37). Upon a closer reading it becomes clear that the size and the shape disclosed in Muraoka (Muraoka col. 6 lines 27-37) are for physical adjustment of the optical spatial filter. The present invention discloses a method to automatically learn the parameter of the directional elongated filter for image processing. This is patentably distinctive from Muraoka's disclosure of physical adjustment of the optical spatial filter and they serve totally different purposes.

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Claim 6:

Claim 6 was rewritten in independent form to include all of the limitations of the base claim and any intervening claims according to the instruction of Examiner Patel. It is in condition for allowance.

Claim 7:

Examiner Patel rejected claims 7 under 35 U.S.C. § 103(a) as being unpatentable over Muraoka (US 58,446,542) in view of Handley (US 6,141,464). Specifically, examiner Patel asserted that the spatial filter of Muraoka masks reflected light which disclosed "masking portions of the image based upon detected mark elements". The Muraoka spatial filter interacts with lights rather than digital images. The detected mark masking of the present invention, which operates in the image domain with the purpose of sequential detection of mark components is patentably distinct from Muraoka's method for reflected light shielding operating in the optical domain.

Claim 8:

Examiner Patel rejected claims 8 on the basis of Handley (col. 5 lines 3-15). Although some of the attributes of Handley may appear to be related to the present invention, upon a closer reading it becomes clear that Handley teaches the simple calculation of centroid for connected components. The determination of structure constraints of the present invention is patentably distinct from Handley's simple calculation of centroid. We added structure to claim 8 to underscore the patentable distinction.

Claim 11:

Examiner Patel rejected claims 11 on the basis that the Muraoka disclosed the windows on the spatial filter that blocks the reflected light through the half mirror (col. 4 lines 12-25). Upon a closer reading it becomes clear that the spatial filtering scheme used in Muraoka is for collecting light through the optical spatial filter. The present invention discloses a weight image for the structure guided estimation process. This is patentably distinctive from Muraoka's disclosure of the optical spatial filtering scheme and they

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serve two totally different purposes. We modified claim 11 to add structure guided estimation process as the limitation of the weight image.

Claim 12:

Examiner Patel rejected claims 12 on the basis that Muraoka disclosed the conversion of scattered lights into image sensor and processed by an image processor to generate a signal strength waveform (col. 4 lines 26-36). Upon a closer reading it becomes clear that the signal strength waveform generation in Muraoka is for mark signal acquisition. The present invention discloses a weight image learning to automatically create weights that emphasize the region of the image containing the essential information needed to draw conclusions for the structure guided estimation process. This is patentably distinctive from Muraoka's disclosure of the signal strength waveform acquisition and they serve totally different purposes.

Claim 13:

Claim 13 was rewritten in independent form to include all of the limitations of the base claim and any intervening claims according to the instruction of Examiner Patel. It is in condition for allowance.

Claim 19:

Claim 19 was rewritten in independent form to include all of the limitations of the base claim and any intervening claims according to the instruction of Examiner Patel. It is in condition for allowance.

Claim 21:

We believe Claim 21 should be in condition for allowance with the same arguments as that for claim 1 and claim 4.

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Conclusion

In view of the above remarks and arguments, applicant submits that the drawings, specification are now in proper form, and that all claims are patentably over the prior art. Therefore applicant submits that this application is in condition for allowance, which action applicant respectfully solicits.

Conditional Request for Constructive Assistance

If for any reason this application is not believed to be in full condition for allowance, applicant respectfully requests the constructive assistance and suggestions of the Examiner pursuant to MPEP para. 707.07(j) in order that the undersigned can place this application in allowable condition as soon as possible and without the need for further proceedings.

Respectfully submitted,



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